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FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS
FOR OREGON

APRIL 1, 1941

By
Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Oregon Agricultural Experiment Station

LIBRARY

Soil Conservation Service
U. S. Department of Agriculture
Washington, D. C.

Data included in this report were obtained by the agencies named above in cooperation with the Oregon State Engineer, U. S. Forest Service, National Park Service and other Federal, State and local organizations.

FINAL 1941 WATER SUPPLY OUTLOOK

The outlook for Oregon 1941 water supply varies widely through the State from very good to critically short. Detailed forecasts begin on Page 16.

Irrigation water prospects which appeared generally favorable two months ago have become extremely variable since then. Little snow was added to the watersheds during February and some melting occurred during March. While soils on most watersheds as well as in farm lands were well wetted by heavy fall and winter rains, irrigation supplies from unregulated stream flow and surface and underground reservoired supplies will be critically short in some sections, though fully ample in others.

Shortages of greater or less extent will exist this year in the region from southern Deschutes County north to the Columbia and east to the Blue Mountains. Full reservoirs and fair to good potential stream flow characterize the territory from there east through Wallowa, Baker and Malheur Counties and along the southeast and southcentral section. Southern Oregon west of the Cascades and central Oregon east of the Cascades will have serious local water shortages this year. Steps to conserve moisture have been recommended in these areas as elsewhere.

One of the most critical shortages is expected in the Milton-Freewater area on the Walla Walla River where scores of irrigation wells are expected to be dry or very low this summer. The large Owyhee and Vale Projects, on the other hand, are starting the season under exceptionally favorable conditions with enough water in storage for two years, soil and growth conditions excellent, and prospective stream flow good for those areas. Water supply conditions in the Harney Basin likewise are exceptionally good.

COMPARISON OF SNOW COVER AS OF APRIL FIRST
WITH THAT OF PREVIOUS YEARS

For Oregon as a whole, and for elevations above 5,000 feet, of the 63 snow courses reporting, 41 were measured last month, 62 were measured about April 1, 1940, 57 were measured about April 1, 1939 and 40 were measured about April 1, 1938. Comparison of records on these courses for the approximate dates mentioned follows:

Snow cover (water content) now present above 5,000 feet:

As percent of that present one month ago	-----	73
As percent of that present one year ago	-----	105
As percent of that present two years ago	-----	74
As percent of that present three years ago	-----	51

For elevations from 2,000 to 5,000 feet, of the 44 snow courses and Copco water stations reporting about April 1, 1941, 34 were measured last month, 41 were measured about April 1, 1940, 40 were measured about April 1, 1939 and 36 were measured about April 1, 1938. Comparison of records on these courses for the approximate dates mentioned follows:

Snow cover (water content) now present from 2,000 to 5,000 feet:

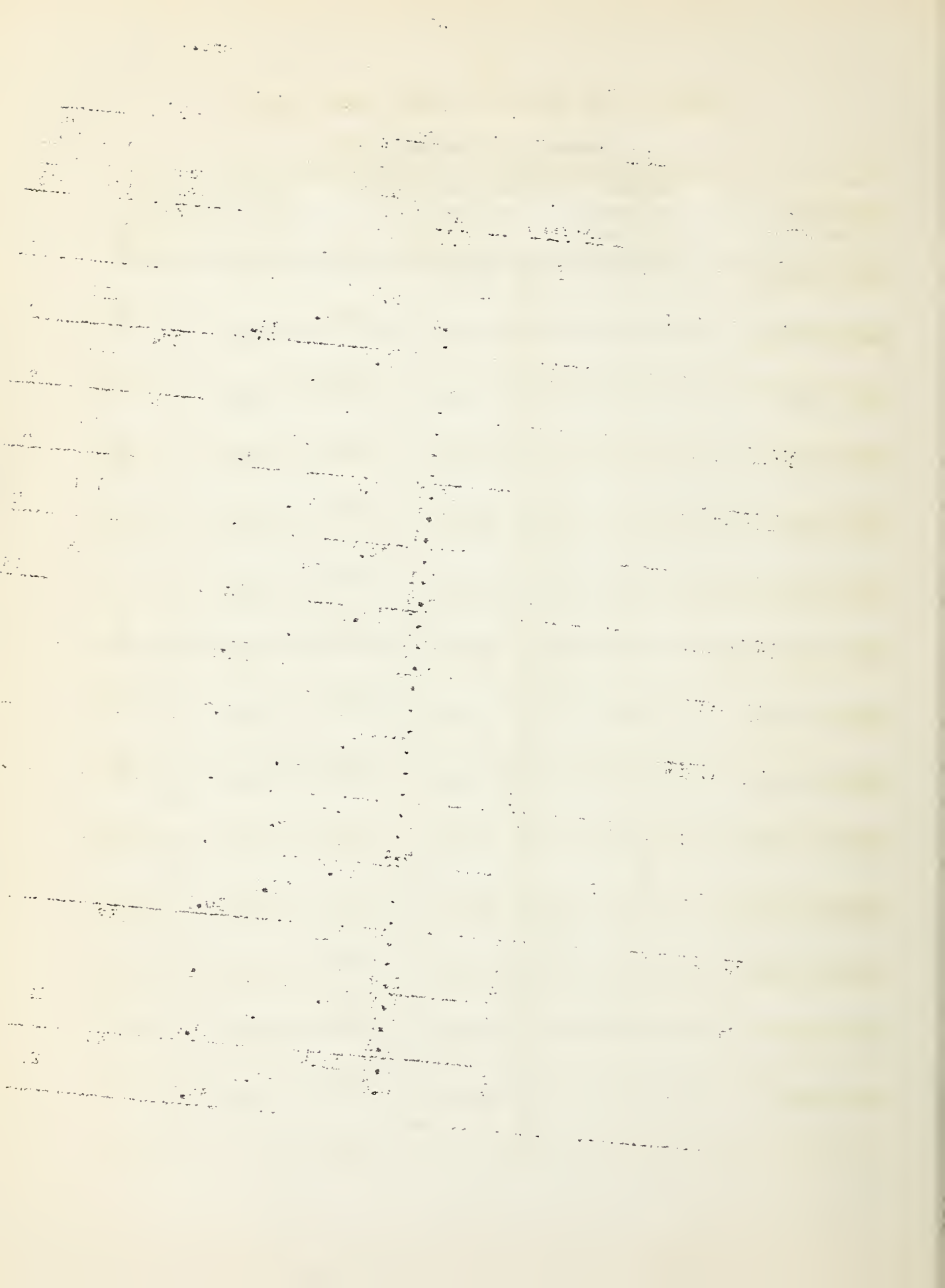
As percent of that present one month ago	-----	16
As percent of that present one year ago	-----	75
As percent of that present two years ago	-----	11
As percent of that present three years ago	-----	7

Snow water content on 79 percent of all of the courses is less than at this time in 1940 and in 83 percent of the comparisons is less than on about April 1 of either 1939 or 1938.

STATUS OF SNOW COVER AS OF APRIL FIRST (Cont.)

Summary of Snow Survey Data
by Tributary Drainages as of about April First

Tributary Drainage	Number of Snow Courses Averaged	Average Water Depth in Snow Cover (Inches)				1941 Snow Water Depth (Inches) as Percent of that in		
		1941	1940	1939	1938	1940	1939	1938
Owyhee River	4	8.8	6.0			147		
	3	8.8		4.5			196	
	3	8.8			18.5			48
Malheur River	5	5.4	2.2			245		
	5	5.4		4.7			115	
	5	5.4			11.8			46
Burnt River	3	6.6	3.8			174		
	3	6.6		3.2			206	
	2	5.8			9.4			62
Powder River	7	11.7	12.2			96		
	7	11.7		14.2			83	
	5	13.3			19.3			69
Pine Creek	1	29.1	17.4			167		
	1	29.1		23.4			124	
	1	29.1			40.6			72
Grande Ronde River	9	13.1	14.9			88		
	9	13.1		19.7			66	
	7	15.8			24.8			64
Walla Walla River	1	12.1	18.7			65		
	1	12.1		29.8			41	
	1	12.1			23.0			53
Umatilla River	4	4.8	6.7			72		
	4	4.8		15.4			31	
	3	4.0			11.7			34
Willow Creek	1	2.8	3.9			72		
	1	2.8		11.9			24	
	1	2.8			12.7			22
John Day River	10	5.8	5.4			107		
	10	5.8		9.4			62	
	8	6.4			14.2			45
Deschutes River	8	10.4	12.6			82		
	8	10.4		27.8			37	
	8	10.4			30.5			34
Crooked River	4	2.9	2.2			132		
	4	2.9		4.9			59	
	4	2.9			10.6			27
Hood River	1	1.1	0.0			1100		
	1	1.1		9.0			12	
	1	1.1			19.0			6
Sandy River	3	6.8	11.5			59		
	3	6.8		34.5			20	
	3	6.8			35.2			19



		1941	1940	1939	1938	1940	1939	1938
Clackamas River	2	0.0	1.4			7		
	2	0.0		18.9			1	
	2	0.0			19.7			1
Willamette River	7	9.4	11.4			82		
	7	9.4		35.4			26	
	4	12.7			35.7			36
Silver Lake Basin	1	0.0	0.0			100		
	-	-		-			-	
	-	-			-			-
Chewaucan River	1	5.1	3.5			146		
	1	5.1		2.2			232	
	-	-			-			-
Harney Basin	8	8.6	4.5			191		
	7	8.5		6.3			135	
	5	4.8			9.4			51
Guano Lake	1	4.8	1.8			267		
	-	-		-			-	
	-	-			-			-
Warner Lake	1	8.1	3.4			238		
	1	8.1		6.7			121	
	-	-			-			-
Umpqua River	7	3.9	4.4			87		
	7	3.9		20.1			19	
	6	4.6			25.9			18
Upper Rogue River	13	11.8	12.3			96		
	13	11.8		21.1			56	
	13	11.8			30.2			39
Applegate River	4	23.1	19.2			120		
	4	23.1		21.0			110	
	4	23.1			39.1			59
Illinois River	2	12.6	7.5			168		
	2	12.6		18.0			70	
	2	12.6			40.2			31
Klamath Lake Basin	*23	7.0	7.2			97		
	*22	6.8		9.7			70	
	*21	7.6			19.1			40
Goose Lake Basin	* 4	2.4	0.8			300		
	* 4	2.4		2.7			89	
	* 2	0.0			14.6			1

Note: *Including Copco water measurement stations.

STATUS OF WATERSHED SOIL MOISTURE

Oregon watershed soils, with rare exceptions, are now unfrozen. In most locations the soil under the snow is reported as wet to very wet. Spring 1941 soil moisture samples were taken on only two southern Oregon snow courses as follow:

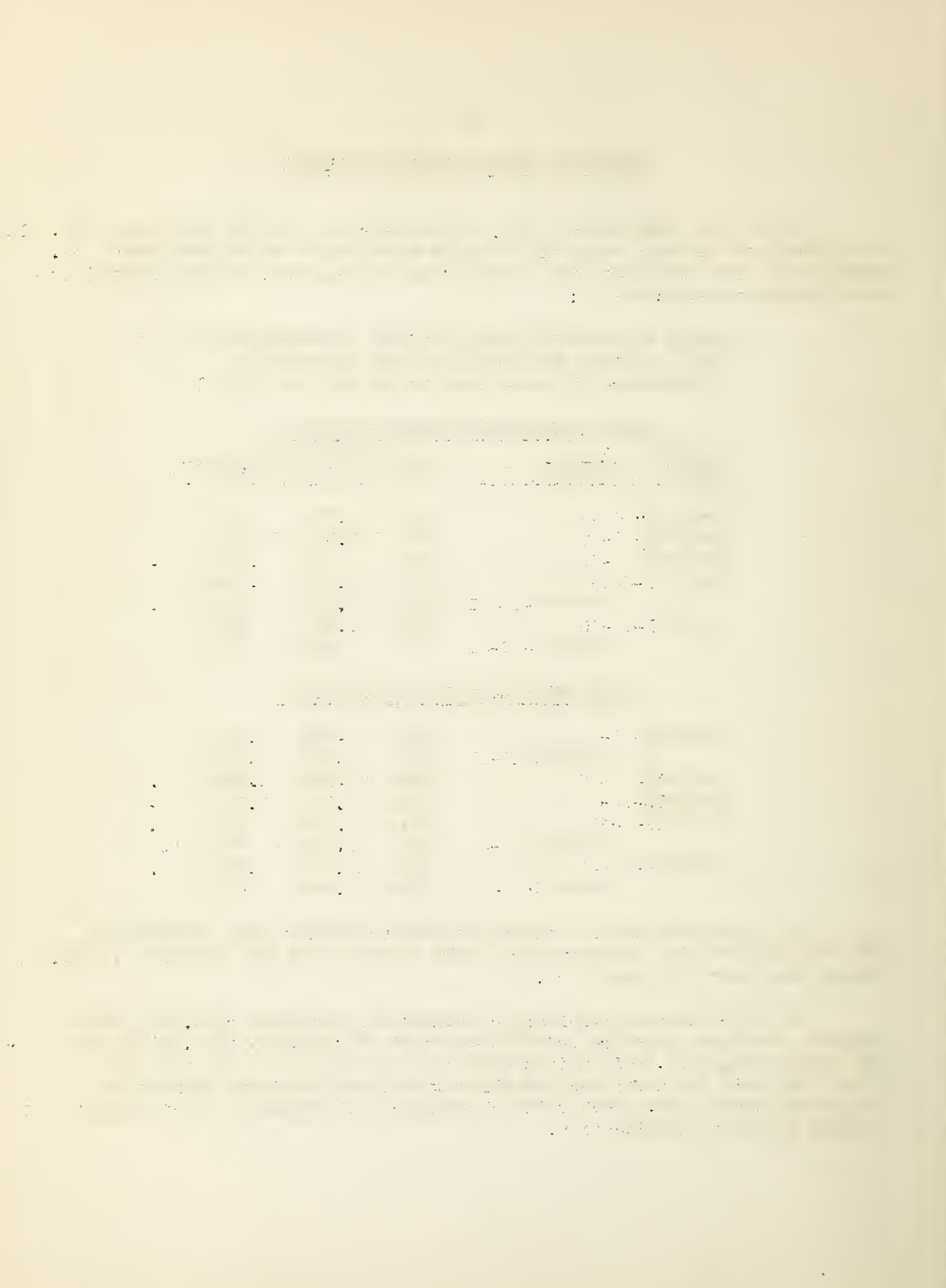
SUMMARY OF WATERSHED SOIL MOISTURE DETERMINATIONS
(Soil moisture each sampling date expressed as percentage of that found in the fall of 1937)

<u>Annie Spring Snow Course 1936-1941</u>				
<u>Date</u>		<u>Feet Depth</u>		
<u>Fall</u>	<u>Spring</u>	<u>0-3'</u>	<u>3-6'</u>	<u>0-6'</u>
11-14-36		27.4	39.2	32.0
10-21-37		100.0	100.0	100.0
10-18-38		59.4	55.5	58.1
11-8-39		60.3	59.3	59.9
	3-20-40	73.7	87.6	79.0
11-13-40		81.5	95.7	87.1
	3-27-41	73.7	75.1	74.3

<u>Fish Lake Snow Course 1936-1941</u>				
11-14-36		48.0	56.8	52.8
	5-11-37	88.5	89.9	89.3
10-22-37		100.0	100.0	100.0
10-14-38		45.1	61.5	53.7
11-7-39		86.5	83.4	85.0
	3-21-40	86.2	93.0	90.0
10-15-40		68.5	68.1	68.4
	3-24-41	78.6	86.6	82.9

For additional data on southern Oregon watershed soil moisture in the fall of 1940, the reader should refer to Page 5 of the February 1, 1941 Oregon Snow Survey Report.

As far as central and eastern Oregon are concerned, watershed soil moisture stations are being established there as possible. In the following tabulation, soil moisture expressed as a percentage of the soil dry weight is shown for each sampling date at each soil moisture station so far established. Each value shown represents the average of three to six samples at each location.



Soil Moisture Station	Depth Date	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	0-3	3-6	0-6
Ochoco Mountain Elev. 5080 Sec. 8, T. 13 S., R. 20 E.	11-21-39 3-26-40 11-15-40 3-18-41	17.0 58.3 40.9 56.1	30.0 53.6 35.0 50.5	39.7 59.7 39.2 43.9	41.7 42.4 43.0 42.4	43.1 41.0 38.0 45.3	43.7 41.8 37.3 45.3	- 40.0 40.2 46.5	- 42.9 40.2 45.9	28.9 57.2 38.4 50.2	42.8 41.7 39.4 44.3	35.9 49.5 38.9 47.2
Blue Mtn. Summit Elev. 5098 Sec. 6, T. 12 S., R. 36 E.	11-20-39 3-26-40 11-15-40 3-19-41	19.8 54.8 48.3 61.0	20.0 32.4 25.3 37.1	19.7 25.2 22.0 31.3	20.9 28.6 23.6 27.4	21.8 23.4 25.1 30.1	- - 27.1 32.5	Bedrock " " "		19.8 37.5 31.9 43.1	- - - 30.0	- - - 36.6
Chemult Elev. 4760 Sec. 21, T. 27 S., R. 8 E.	3-27-40 11-14-40 3-18-41	63.2 34.7 56.7	53.7 34.5 36.2	51.4 32.4 36.5	52.6 32.5 36.6	42.0 34.1 37.4	37.7 35.4 38.0	41.8 38.3 40.9	44.9 40.7 43.8	56.1 33.9 43.1	44.1 34.0 37.3	50.1 33.9 40.2
Dooley Mtn. Elev. 5300 Sec. 32, T. 11 S., R. 40 E.	11-16-40 3-19-41	38.9 47.4	17.9 21.9	9.2 19.7	8.2 18.8	11.8 24.6	13.1 22.3	Bedrock "		22.0 29.7	11.0 21.9	16.5 25.8
Granite-Sumpter Div. Elev. 5790 Sec. 22, T. 9 S., R. 36 E.	11-16-40 3-19-41	44.0 58.5	14.0 24.9	6.3 13.9	8.1 14.9	6.0 7.5	Bedrock "			21.4 32.4	- -	- -

STATUS OF RESERVOIR STORAGE AS OF APRIL FIRST

In the following tabulation, water storage in acre feet in important Oregon reservoirs as of about April 1, 1941 is compared with storage as of about March 1, 1941, as well as with storage as of approximately April 1 of 1940, 1939 and 1938.

Storage Reservoir	Stream Basin	Capacity Acre Ft.	Acre Feet in Storage			
			About 4-1-41	About 3-1-41	About 4-1-40	About 4-1-39
Agency Valley	Malheur	60,000	58,790	48,240	60,300	54,280
Antelope	Owyhee	33,434	24,500	15,000	18,093	5,990
Clear Lake	Lost River	440,240 ^b	257,790 ^b	245,200 ^b	277,920 ^b	249,600 ^b
Crane Prairie	Deschutes	55,336 ^c	26,420	23,000	36,230	33,000
Crescent Lake	Deschutes	80,000	21,980	22,700	32,560	56,760
Drew Creek	Goose Lake	62,500	52,000	30,900	58,070	46,640
Emigrant Gap	Rogue	8,200	Full	Full	Full	Full
Fish Lake	Rogue	7,720	3,760	3,604	5,025	6,202
Four Mile Lake	Klamath ^d	14,000	3,365	2,988	8,100	10,628
Gerber	Klamath	94,000 ^b	62,420 ^{b,a}	50,880 ^{b,g}	80,120 ^b	54,390 ^b
Hyatt Prairie	Klamath ^d	16,000	4,356	3,055	7,340	11,104
McKay	Umatilla	75,000	34,250	29,100	54,160	60,400
Ochoco	Crooked	47,500	10,060	5,780	17,490	30,630
Owyhee	Owyhee	715,000	Full	594,570	611,150	688,850
Thief Valley	Powder	17,400	Full	Full ^h	Full	13,420
Upper Klamath Lake	Klamath	524,800 ^b	404,500 ^b	327,700 ^b	488,400 ^b	462,500 ^b
Wallawa Lake	Wallawa	40,920	19,420	18,070	13,820	38,200
Warnsprings	Malheur	190,000	181,450	127,000	134,800	163,520
Willow Creek	Malheur	26,000	Footnote ⁱ	4,800	6,500 ^e	8,250

a - 3,900 A.F. released during March, 1941.

b - Available for use.

c - 40,500 by agreement.

d - By ditch to Rogue River side.

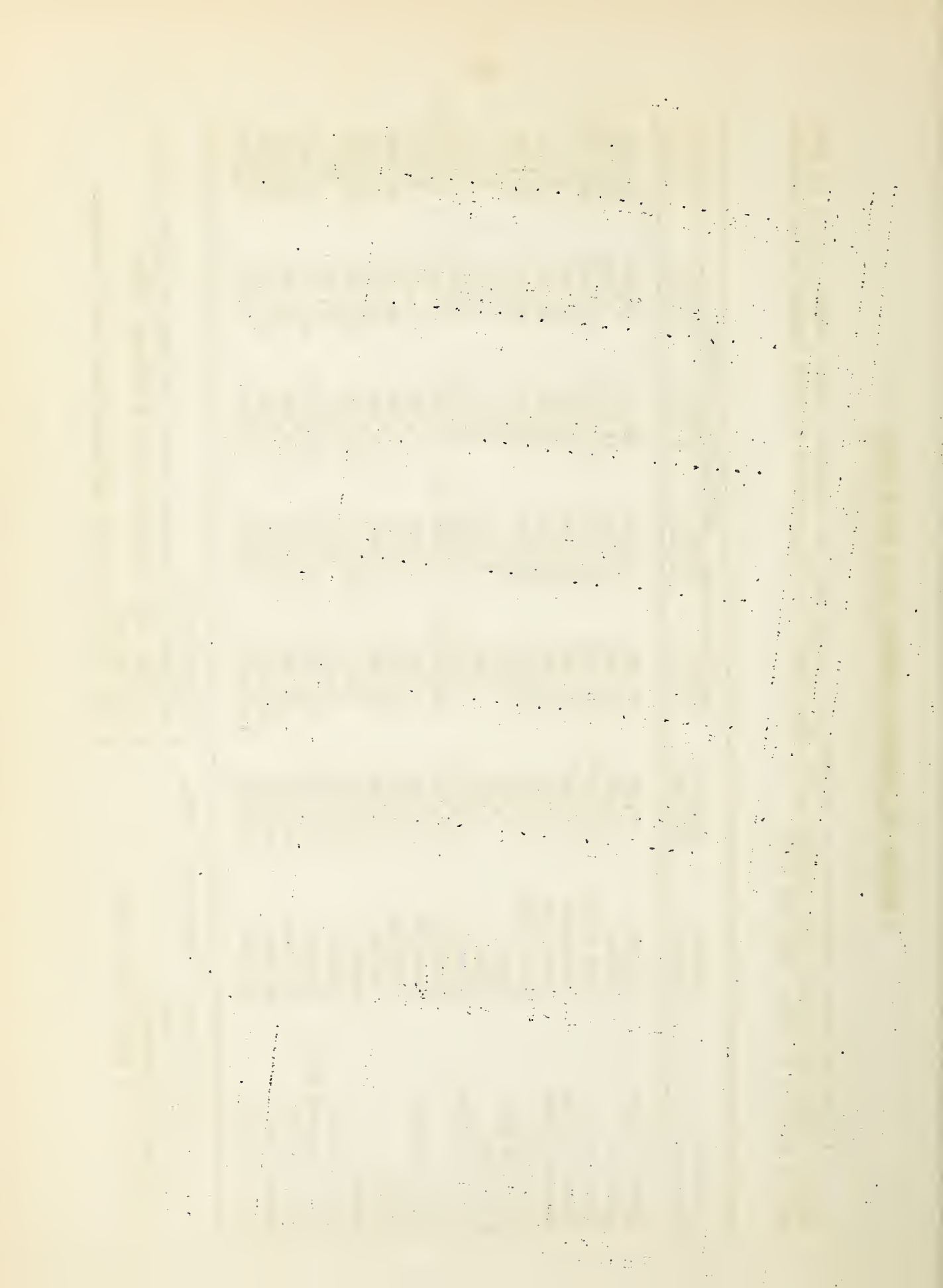
e - Approximate.

f - 28,000 A.F. released during February and March, 1938.

g - 7,830 A.F. released during February, 1941.

h - Estimated.

i - No report, but big increase over 3-1-41 storage.



STATUS OF VALLEY PRECIPITATION AS OF OCTOBER 1 TO DATE

Month	Oct.		Nov.		Dec.		Jan.		Feb.		Mar.		Period	
Section	P	D	P	D	P	D	P	D	P	D	P	D	P	D
S.E.	2.22	+1.57	1.00	+0.12	0.74	-0.16	1.71	+0.61	1.56	+0.61	0.2	-0.6	7.43	+2.15
S.C.	1.71	+0.70	1.44	-0.15	2.00	+0.17	2.27	+0.24	2.27	+0.86	0.9	-0.4	10.59	+1.42
N.C.	0.94	+0.13	1.07	-0.39	1.11	-0.42	1.42	-0.45	1.07	-0.20	0.4	-0.6	6.01	-1.93
Col. Riv.	1.61	+0.64	1.80	+0.09	1.15	-0.45	1.54	-0.04	0.85	-0.51	0.4	-0.6	7.35	-0.87
Wal. Mts.	2.55	+1.21	2.10	+0.09	1.17	-0.78	1.58	-0.80	0.95	-0.40	0.3	-1.4	8.65	-2.08
Blue Mts.	2.62	+1.10	2.45	+0.34	1.23	-0.88	1.54	-0.92	1.57	-0.36	0.5	-1.3	9.91	-2.02
Southern	1.76	-0.02	2.92	-0.92	4.19	+0.65	3.03	-0.62	2.52	-0.62	1.1	-1.4	15.52	-2.93
Willamette	5.14	+1.10	7.13	-1.05	6.19	-1.83	6.36	-1.52	2.15	-4.06	2.5	-3.0	29.47	-10.36
Area	2.32	+0.80	2.49	-0.23	2.22	-0.46	2.43	-0.44	1.62	-0.58	0.8	-1.2	11.87	-2.08

P - Inches precipitation.

D - Inches departure from normal.

S.E. - Southeastern Oregon range lands, Harney and Malheur Counties.

S.C. - Southcentral Oregon range lands, Lake County and Klamath County, except the Cascade Mountains.

N.C. - Northcentral Oregon wheat and range lands, Crook, Deschutes, Jefferson, Wheeler and part of Grant Counties.

Col. Riv. - Columbia River area, wheat and range lands, Gilliam, Morrow, Sherman, Wasco and part of Umatilla Counties.

Wal. Mts. - Wallowa Mountain area, forest and range lands, Wallowa and part of Baker County.

Blue Mts. - The Blue Mountain forest and range area, Union and parts of Baker, Grant and Umatilla Counties.

Southern - Southern Oregon irrigated section, Jackson and Josephine Counties.

Willamette - Parts of Polk, Benton, Yamhill, Washington, Lane and all of Linn, Marion, Clackamas and Multnomah Counties.

Note: Data for the last month shown above are preliminary only, as they are based on a few stations only. Data for earlier months have been corrected to include all the stations in climatological data for the area.





Scale in Miles
0 10 20 30 40

REGION 9	
OREGON WATERSHEDS	
SNOW SURVEYS	
U. S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
REFERENCE: New U.S. Geological Survey	
DRAWING APPROVAL	TECHNICAL APPROVAL
DATE	DATE
DESIGNED	DRAWN
CHECKED	REVIEWED
BY	BY
BY	BY

INDEX TO SNOW COURSES

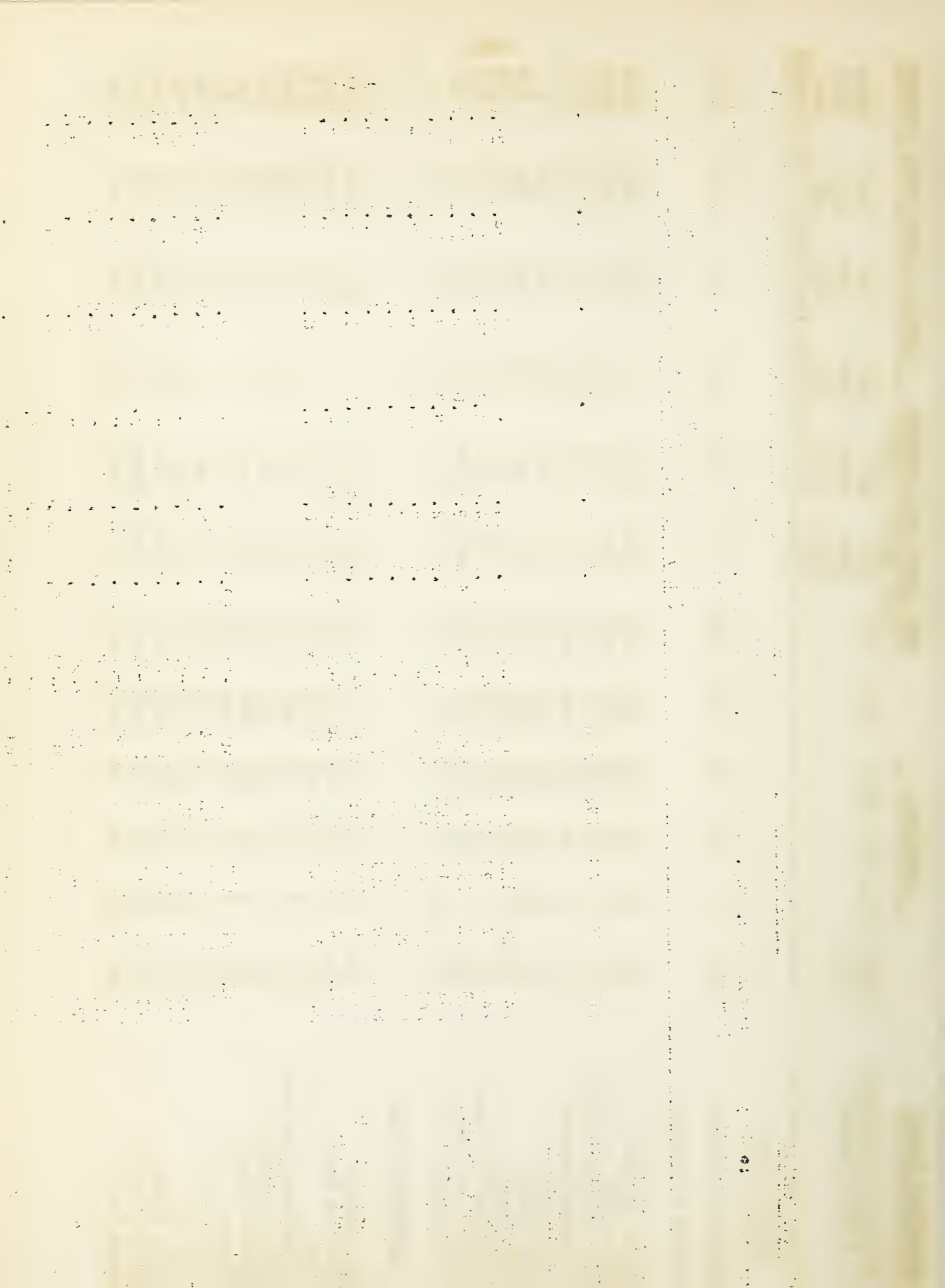
Number	Name	Elev.	Number	Name	Elev.	Number	Name	Elev.
UPPER COLUMBIA DRAINAGE								
Lower Snake in Oregon								
ONYHEE RIVER								
Nov.1	Big Bend	6800	212	Tollgate	5070	831	Annie Spring	6018
Nov.2	Buckskin, Lower	6800				722	Billie Creek Divide	6000
Nov.3	Buckskin, Upper	8200				834	Chemult No. 1	4760
952	Fish Creek	7900				Callif.	Crowder Flat	5200
Nov.5	Fry Canyon	6800	222	Emigrant Springs	3925	835	Hyatt Prairie Reservoir	4900
Nov.6	Gold Creek Ranger Sta.	6600	223	Lucky Strike	4300	723	Lake of the Woods	4960
Nov.7	Granite Peak	8600	221	Meacham	4300	811	Quartz Mountain	5320
Nov.8	Jack Creek, Lower	7000	212	Tollgate	5070	7211	Seven Lakes No. 1	6800
Nov.9	Jack Creek, Upper	7800				7212	Seven Lakes No. 2	6200
Nov.10	Martin Creek	7000				7213	Seven Lakes No. 2	6200
Nov.11	Todeo Flat	7000	241	Arbuckle Mountain	5400	837	Strawberry	5600
Ida.12	Silver City	6400				841	Summer Rim	7200
Ida.13	South Mountain	6900				836	Sun Mountain	5350
Nov.15	Taylor Canyon	5200				842	Taylor Butte	5100
MALHEUR RIVER								
133	Blue Mountain Spring	5900	241	Arbuckle Mountain	5400	911A	Canas Creek	5720
137	Crane Prairie	5375	216A	Beech Creek Summit	4800	811	Quartz Mountain	5720
136	Lake Creek	5136	133	Blue Mountain Spring	5900	837	Strawberry	5600
134	Rock Spring	5100	141	Blue Mountain Summit	5098			
135	Stinking Water	4800	244	Dixie Springs	6650			
			249	Gold Center	5340			
			964	Izee Summit	5293			
			245	Olive Lake	6000			
			248	Schoolmarn	4775			
			247	Starr Ridge	5156			
BURNT RIVER								
141	Blue Mountain Summit	5098						
156	Dooley Mountain	5430	326	Caldwell Ranch	4400			
142	Tipton	5100	321	Cascade Summit	4880			
			327	Charlton Lake	5750			
			361	Clear Lake	3500			
			325	Crescent Lake	4760			
155	Anthony Lake	7125	325	Derr	5670			
154	Bourne	5800	343	Hogg Pass	4755			
156	Dooley Mountain	5430	351	Marks Creek	4540			
1518	Ellertson Meadows	5400	344	New Dutchman Flat	6400			
219	Gold Center	5340	324A	Ochoo Meadows	5200			
184	Summit Springs	6000	311	Tamarack	4800			
185	Taylor Green	5740	342	Three Creeks Meadows	5600			
			331					
PINE CREEK								
161	Schneider Meadows	5400	431	Brooks Meadows	4300			
GRANDE RONDE RIVER								
183	Aneroid Lake	7480						
155	Anthony Lake	7125	361	Clear Lake	3500			
188	Beaver Reservoir	5340	452	Phlox Point - Mt. Hood	5600			
187	Camp Carson	5970	451	Still Creek	3700			
186	Moss Spring	5860						
248	Schoolmarn	4775						
184	Summit Springs	6000						
185	Taylor Green	5740						
212	Tollgate	5070						
LOWER COLUMBIA DRAINAGE								
WALLA WALLA RIVER								
UMATILLA RIVER								
EMIGRANT SPRINGS								
LUCKY STRIKE								
MEACHAM								
TOLLGATE								
WILLOW CREEK								
ARBUCKLE MOUNTAIN								
JOHN DAY RIVER								
ARBUCKLE MOUNTAIN								
BEECH CREEK SUMMIT								
BLUE MOUNTAIN SPRING								
DIXIE SPRINGS								
GOLD CENTER								
IZEE SUMMIT								
OLIVE LAKE								
SCHOOLMARN								
STARR RIDGE								
DESCHUTES RIVER								
CALDWELL RANCH								
CASCADE SUMMIT								
CHARLTON LAKE								
CLEAR LAKE								
CRESCENT LAKE								
DERR								
HOGG PASS								
MARKS CREEK								
NEW DUTCHMAN FLAT								
OCHOO MEADOWS								
TAMARACK								
THREE CREEKS MEADOWS								
HOOD RIVER								
BROOKS MEADOWS								
SANDY RIVER								
CLEAR LAKE								
PHLOX POINT - Mt. Hood								
STILL CREEK								
CLACKAMAS RIVER								
CLACKAMAS LAKE								
PEAVINE RIDGE								
WILLAMETTE RIVER								
BREITENBUSH								
CASCADE SUMMIT								
CHAMPION								
CHARLTON LAKE								
HOGG PASS								
MCKENZIE								
MARION FORKS								
MARY'S PEAK								
SANTIAM JUNCTION								
WALDO LAKE								
KLAMATH LAKE BASIN								
ANNE SPRING								
BILLIE CREEK DIVIDE								
CROWDER FLAT								
HYATT PRAIRIE RESERVOIR								
LAKE OF THE WOODS								
QUARTZ MOUNTAIN								
SEVEN LAKES NO. 1								
SEVEN LAKES NO. 2								
STRAWBERRY								
SUMMER RIM								
SUN MOUNTAIN								
TAYLOR BUTTE								
GOOSE LAKE BASIN								
CANAS CREEK								
QUARTZ MOUNTAIN								
STRAWBERRY								
WEST COAST DRAINAGE								
UMPUQUA RIVER								
CHAMPION								
DIAMOND LAKE								
GOOLAWAY GAP								
GOOLAWAY MOUNTAIN								
N.UMPUQUA NEAR LAKE CREEK								
TRAP CREEK								
WHALEBACK								
HOQUE RIVER								
ALTHOUSE								
ANNE SPRING								
BIG RED MOUNTAIN								
BILLIE CREEK DIVIDE								
FISH LAKE								
GOOLAWAY GAP								
GOOLAWAY MOUNTAIN								
GRAYBACK PEAK								
HYATT PRAIRIE RESERVOIR								
LITTLE RED MOUNTAIN								
SEVEN LAKES NO. 1								
SEVEN LAKES NO. 2								
SILVER BURN								
SISKIYOU SUMMIT								
SOUTH FORK CANAL								
WAGNER BUTTE								
WHALEBACK								

TRIBUTARY BASINS (Primary & Secondary & Snow Courses)	LOCATION		SNOW COVER MEASUREMENTS About April 1, 1941				AVERAGE WATER DEPTH (INCHES)					
	Oregon Number	Sec. Twp. Range	Elev.	Date	Avg. Snow Depth (In.)	Avg. Water Depth (In.)	One Month ago (3-1-41)	One Year ago (4-1-40)	Two Years ago (4-1-39)	Three Years ago (4-1-38)		
<u>U P P E R C O L U M B I A D R A I N A G E</u>												
<u>L O W E R S N A K E I N O R E G O N</u>												
OWYHEE RIVER												
Upper Buckskin	Nev.	14	45N	39E	8200	3-27	29.6	12.0	13.4	8.8	3.7	17.5
Big Bend	Nev.	30	45N	56E	6800	3-26	25.7	9.7	9.9	3.8	3.4	11.4
Silver City	Idaho	6	5S	3W	6400	3-28	11.9	4.6	9.9	3.2	6.5	26.6
South Mountain No. 2	Idaho		7S	5W	7000	3-29	21.0	9.0	11.0	8.1	-	-
MALHEUR RIVER												
Blue Mountain Spring	133	21	15S	35E	5900	3-30	23.0	9.8	14.0	8.8	11.1	23.4
Crane Prairie	137	24	16S	34E	5375	3-30	14.0	6.1	9.5	1.0	3.8	11.5
Lake Creek	136	10	16S	33½E	5120	3-30	16.9	7.3	12.8	1.0	7.7	14.3
Rock Spring	134	23	18S	32E	5100	3-26	10.0	3.9	7.3	0.0	0.9	8.8
Stinking Water	135	33	21S	34E	4800	3-31	0.0	0.0	6.5	0.0	0.0	1.2
BURNT RIVER												
Dooley Mountain	156	32	11S	40E	5430	3-26	21.0	8.2	11.3	5.3	3.0	-
Tipton	142	34	10S	35½E	5100	3-25	13.2	8.9	-	5.2	3.5	9.9
Blue Mountain Summit	141	6	12S	36E	5098	3-26	8.4	2.8	8.1	1.0	3.0	8.9
POWDER RIVER												
Anthony Lake	155	18	7S	37E	7125	3-24	56.3	19.2	20.2	21.8	30.0	25.0
Summit Springs	184	9	6S	37E	6000	3-26	45.3	16.7	-	17.3	20.2	22.9
Bourne	154	33	8S	37E	5800	3-26	27.3	10.3	10.6	11.9	11.1	17.1
Taylor Green	185	3	6S	42E	5740	3-27	30.9	11.9	-	12.0	15.7	15.8
Dooley Mountain	156	32	11S	40E	5430	3-26	21.0	8.2	11.3	5.3	3.0	-

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TRIBUTARY BASINS		LOCATION		SNOW COVER MEASUREMENTS				AVERAGE WATER DEPTH (INCHES)			
(Primary & Secondary & Snow Courses)		Oregon Number	Sec. Twp. Range	Elev.	Date	Avg. Snow Depth (In.)	Avg. Water Depth (In.)	One Month ago (3-1-41)	One Year ago (4-1-40)	Two Years ago (4-1-39)	Three Years ago (4-1-38)
About April 1, 1941											
PINE CREEK											
Eilertson Meadows	151B	18	8S	38E	5400	3-26	21.0	8.5	10.6	10.7	9.8
Gold Center	249	21	9S	36E	5340	3-26	17.6	6.9	11.0	6.8	9.6
Schneider Meadows											
	161	35	6S	45E	5400	3-26	70.6	29.1	-	17.4	23.4
GRANDE RONDE RIVER											
Aneroid Lake	183	16	4S	45E	7480	3-22	77.8	28.4	-	31.5	30.1
Anthony Lake	155	18	7S	37E	7125	3-24	56.3	19.2	20.2	21.8	30.0
Summit Springs	184	9	6S	37E	6000	3-26	45.3	16.7	-	17.3	20.2
Camp Carson	187	33	6S	36E	5970	3-27	16.6	5.7	-	0.0	10.6
Moss Spring	186	27	3S	41E	5860	3-26	44.3	16.7	16.9	20.9	28.0
Taylor Green	185	3	6S	42E	5740	3-27	30.9	11.9	-	12.0	15.7
Beaver Reservoir	188	8	5S	37E	5340	3-25	20.8	6.9	6.8	11.7	8.6
Schoolmain	248	28	4S	34E	4775	3-29	0.0	0.0	2.7	0.0	4.4
Meacham	221 24&25	1S	1S	35E	4300	3-26	0.0	0.0	3.6	1.3	10.4
WALLA WALLA RIVER											
Tollgate	212	32	4N	38E	5070	3-25	27.3	12.1	15.6	18.7	29.8
UMATILLA RIVER											
Tollgate	212	32	4N	38E	5070	3-25	27.3	12.1	15.6	18.7	29.8
Lucky Strike	223	28	3S	32E	5050	3-27	23.1	7.1	9.7	6.9	13.9
Meacham	221 24&25	1S	1S	35E	4300	3-26	0.0	0.0	3.6	1.3	10.4
Emigrant Springs	222	29	1N	35E	3925	3-26	0.0	0.0	1.6	0.0	7.7

TRIBUTARY BASINS		LOCATION			SNOW COVER MEASUREMENTS				AVERAGE WATER DEPTH (INCHES)			
(Primary & Secondary & Snow Courses)	Oregon Number	Sec. Twp. Range	Elev.	Date	About April 1, 1941		One Month ago (3-1-41) (4-1-40) (4-1-39) (4-1-38)	Two Years ago (4-1-39) (4-1-38)	Three Years ago (4-1-38)			
					Avg. Snow Depth (In.)	Avg. Water Depth (In.)						
WILLOW CREEK												
Arbuckle Mountain	241	33	4S	29E	5400	3-29	7.5	2.8	9.3	3.9	11.9	12.7
JOHN DAY RIVER												
Dixie Springs	244	28	11S	34E	6650	3-25	45.8	17.2	-	18.8	24.1	28.0
Elvie Lake	245	14	9S	33½E	6000	3-26	37.6	14.4	13.3	15.0	15.6	19.6
Blue Mountain Spring	133	21	15S	35E	5900	3-30	23.0	9.8	14.0	8.8	11.1	23.4
Arbuckle Mountain	241	33	4S	29E	5400	3-29	7.5	2.8	9.3	3.9	11.9	12.7
Gold Center	249	21	9S	36E	5340	3-26	17.6	6.9	11.0	6.8	9.6	-
Izee Summit	964	28	16S	29E	5293	3-25	10.3	3.1	7.7	0.0	6.2	8.8
Starr Ridge	247B	20	15S	31E	5150	3-25	3.6	1.1	5.8	0.0	1.6	5.0
Blue Mountain Summit	141	6	12S	36E	5098	3-26	8.4	2.8	8.1	1.0	3.0	8.9
Beech Creek Summit	246A	4	12S	30E	4800	3-26	Trace	Trace	5.2	0.0	6.0	7.3
Schoolmarn	248	28	4S	34E	4775	3-29	0.0	0.0	2.7	0.0	4.4	-
DESCHUTES RIVER												
New Dutchman	324A	21	18S	9E	6400	3-28	69.5	32.7	-	39.9	60.9	60.2
Charlton Lake	327	23	21S	6E	5750	3-30	33.6	13.0	-	13.9	29.6	34.5
Derr	343	14	13S	23E	5670	3-31	14.3	5.7	-	5.2	7.5	13.4
Three Creeks Meadows	331	3	17S	9E	5600	3-27	17.9	7.5	-	8.7	19.9	24.6
Ochoco Meadows	341	21	13S	20E	5200	3-31	11.1	4.6	9.8	3.8	7.6	14.7
Cascade Summit	321	7	23S	6½E	4880	3-26	25.6	11.4	-	15.4	38.5	31.4
Tamarack	342	8	15S	25E	4800	3-28	3.6	1.3	-	0.0	1.8	8.7
Crescent Lake	325	11	24S	6E	4760	3-26	0.0	0.0	-	0.0	12.9	16.3
Hogg Pass	351	24	13S	7½E	4755	3-27	42.6	18.6	21.4	20.4	44.4	44.0
Marks Creek	344	25	12S	19E	4540	4-1	0.0	0.0	3.9	0.0	2.6	6.1
Caldwell Ranch	326	30	21S	8E	4400	3-29	Trace	Trace	-	0.8	3.8	15.9
Clear Lake	361	29	4S	9E	3500	3-26	0.7	0.2	3.2	1.5	12.5	16.7



TRIBUTARY BASINS

(Primary & Secondary & Snow Courses)	Oregon Number	LOCATION	SNOW COVER MEASUREMENTS			AVERAGE WATER DEPTH (INCHES)		
			About April 1, 1941					
			Date	Avg. Snow Depth (In.)	Avg. Water Depth (In.)	One Month ago (3-1-41)	One Year ago (4-1-40)	Two Years ago (4-1-39)

Three
Years
ago
(4-1-38)

HOOD RIVER

Brooks Meadows 431 2 2S 10E 4300 3-24 3.4 1.1 0.0 9.0 19.0

SANDY RIVER

Phlox Point - Mt. Hood 452 6 3S 9E 5600 3-28 42.4 20.2 27.2 65.7 65.7
Still Creek 451 25 3S 8½E 3700 3-28 0.0 0.0 5.3 25.2 23.2
Clear Lake 361 29 4S 9E 3500 3-26 0.7 0.2 3.2 12.5 16.7

CLACKAMAS RIVER

Peavine Ridge 591 14&15 6S 7E 3500 4-2 0.0 0.0 4.3 23.3 23.7
Clackamas Lake 592 35 5S 8½E 3400 4-1 0.0 0.0 2.9 14.5 15.7

WILLAMETTE RIVER

Charlton Lake 327 23 21S 6E 5750 3-30 33.6 13.0 13.9 29.6 34.5
Waldo Lake 521A 15 21S 6E 5500 3-31 20.1 7.8 11.2 31.0 33.0
Cascade Summit 321 7 23S 6½E 4880 3-26 25.6 11.4 15.4 38.5 31.4
McKenzie 531 35 15S 7½E 4800 3-28 38.4 14.8 17.2 44.8 -
Hogg Pass 351 24 13S 7½E 4755 3-27 42.6 18.6 20.4 44.4 44.0
Champion 522 12 23S 1E 4500 3-28 0.0 0.0 1.9 44.4 -
Santiam Junction 552 14 13S 7E 3990 3-27 0.0 0.0 4.6 14.8 -
Mary's Peak 541 21 12S 7W 3620 4-1 0.0 0.0 0.0 - -
Marion Forks 553 28 11S 7E 2730 3-27 0.0 0.0 0.0 - -
Breitenbusch 551 21 9S 7E 2325 3-28 0.0 0.0 0.0 - -

INTERIOR DRAINAGE

SILVER LAKE

Silver Creek 942 25&26 29S 13E 4900 4-1 0.0 0.0 0.0 - -

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TRIBUTARY BASINS (Primary & Secondary & Snow Courses)	LOCATION			SNOW COVER MEASUREMENTS About April 1, 1941			AVERAGE WATER DEPTH (INCHES)				
	Oregon Number	Sec.	Twp. Range	Elev.	Date	Avg. Snow Depth (In.)	Avg. Water Depth (In.)	One	One	Two	Three
								Month ago (3-1-41)	Year ago (4-1-40)	Years ago (4-1-39)	Years ago (4-1-38)
CHEWAUCAN RIVER											
Mill Creek	922	1	34S 17E	6200	3-31	15.5	5.1	7.9	3.5	2.2	-
HARNEY BASIN											
Fish Creek	952	4	33S 33E	7900	3-26	58.9	21.7	-	22.7	22.2	-
Silvies	951	35	32S 33E	6900	3-25	32.4	13.8	-	8.4	12.1	16.6
Deer Creek	973	17	36S 26E	6670	3-28	22.5	9.1	8.6	4.2	-	-
Hart Mountain	971	1	36S 25E	6350	3-27	0.0	0.0	5.1	0.6	0.0	-
Izee Summit	964	28	16S 29E	5293	3-25	10.3	3.1	7.7	0.0	6.2	8.8
Idylwild	961A	33	20S 31E	5200	3-26	5.1	2.3	6.3	0.0	1.0	7.7
Starr Ridge	247B	20	15S 31E	5150	3-25	3.6	1.1	5.8	0.0	1.6	5.0
Rock Spring	134	23	18S 32E	5100	3-26	10.0	3.9	7.3	0.0	0.9	8.8
GUANO LAKE											
Bald Mountain	Nev.	17	45N 21E	6720	3-28	11.6	3.8	5.9	1.1	-	-
Guano Creek	972	13	36S 25E	6480	3-27	15.1	5.7	7.3	2.4	-	-
WARNER LAKE											
Camas Creek	911A	5	39S 21E	5720	3-27	18.6	8.1	-	3.4	6.7	-
UMPQUA RIVER											
Diamond Lake	743	29	27S 6E	5315	3-28	17.7	6.7	12.8	9.8	19.8	33.1
Whaleback	7217	3	31S 2E	5140	3-26	48.0	20.8	-	19.5	38.4	45.4
Champion	522	12	23S 1E	4500	3-28	0.0	0.0	13.3	1.9	44.4	-
No.Umpqua near Lake Creek	742	19	26S 6E	4215	3-31	0.0	0.0	-	0.0	15.9	19.7

TRIBUTARY BASINS (Primary & Secondary & Snow Courses)	LOCATION			SNOW COVER MEASUREMENTS About April 1, 1941				AVERAGE WATER DEPTH (INCHES)				
	Oregon Number	Sec.	Twp.	Range	Elev.	Date	Avg.	Avg.	One	One	Two	Three
							Snow Depth (In.)	Water Depth (In.)	Month ago (3-1-41)	Year ago (4-1-40)	Years ago (4-1-39)	Years ago (4-1-38)
Trap Creek	741	1	27S	4E	3800	3-31	0.0	0.0	-	0.0	18.1	23.3
Goolaway Mountain	7215	30	32S	3W	3730	3-28	0.0	0.0	Trace	0.0	4.1	24.0
Goolaway Gap	726	32	32S	3W	3000	3-28	0.0	0.0	0.0	0.0	0.1	10.0
ROGUE RIVER												
Wagner Butte	7213	1	40S	1W	6900	3-28	32.6	12.4	12.4	13.2	15.8	21.6
Seven Lakes No. 1	7211	3	34S	5E	6800	3-29	95.2	40.7	-	40.4	57.5	72.0
Big Red Mountain	729	33	40S	1W	6500	3-30	78.9	34.6	-	27.9	21.5	44.6
Little Red Mountain	7210	25	40S	2W	6500	3-30	44.8	20.2	-	20.5	17.4	37.4
Scragg Mountain	7220	9	47N	10W	6200	3-29	47.2	21.8	26.4	-	-	-
Seven Lakes No. 2	7212	26	33S	5E	6200	3-28	72.1	32.4	-	31.7	43.3	49.3
Annie Spring	831	19	31S	6E	6018	3-28	83.8	39.8	39.9	44.1	37.4	61.9
Billie Creek Divide	722	30	36S	5E	6000	3-29	14.2	6.7	13.5	9.4	33.1	26.4
Grayback Peak	727	9	40S	5W	6000	3-27	54.2	25.2	-	15.0	29.4	52.7
Whaleback	7217	3	31S	2E	5140	3-26	48.0	20.8	-	19.5	38.4	45.4
Hyatt Prairie Reservoir	723	15	39S	3E	4900	3-28	Patches		7.2	1.5	12.2	17.1
Fish Lake	725	3	37S	4E	4865	3-28	0.0	0.0	2.8	0.0	19.2	19.0
Siskiyou Summit	728	17	40S	2E	4630	4-1	0.0*	0.0	0.0	0.0	1.0	15.5
Althouse	7216	17	41S	7W	4400	4-1	0.0	0.0	3.7	0.0	6.7	27.6
Goolaway Mountain	7215	30	32S	3W	3730	3-28	0.0	0.0	Trace	0.0	4.1	24.0
Silver Burn	7219	30	30S	4E	3720	4-1	0.0	0.0	Trace	0.0	12.7	23.3
South Fork Canal	7218	12	33S	3E	3500	4-1	0.0	0.0	0.0	0.0	0.0	7.4
Goolaway Gap	726	32	32S	3W	3000	3-28	0.0	0.0	0.0	0.0	0.1	10.0
KLAMATH LAKE BASIN												
Summer Rim	841	15	33S	16E	7200	3-29	36.3	12.4	13.6	13.5	N.R.	20.6
Seven Lakes No. 1	7211	3	34S	5E	6800	3-29	95.2	40.7	-	40.4	57.5	72.0
Seven Lakes No. 2	7212	26	33S	5E	6200	3-28	72.1	32.4	-	31.7	43.3	49.3

Note: *6 inches snow reported here April 5; melting fast.

Note: *6 inches snow reported here April 5; melting fast.

TRIBUTARY BASINS		LOCATION		SNOW COVER MEASUREMENTS					AVERAGE WATER DEPTH (INCHES)			
(Primary & Secondary & Snow Courses)		Oregon Number	Sec. Twp. Range	Elev.	Date	Avg. Snow Depth (In.)	Avg. Water Depth (In.)	One Month ago (3-1-41)	One Year ago (4-1-40)	Two Years ago (4-1-39)	Three Years ago (4-1-38)	
Annie Spring		831	19 31S	6E	6018	3-28	83.8	39.8	39.9	44.1	37.4	61.9
Billie Creek Divide		722	30 36S	5E	6000	3-29	14.2	6.7	13.5	9.4	33.1	26.4
Strawberry		837	4 40S	16E	5600	3-28	3.0	1.7	8.7	0.0	4.0	-
Quartz Mountain 2/			33 37 S	16E	5504	4-1	0.0	0.0	8.8	0.0	0.0	13.6
Sun Mountain		836	22 32S	7 1/2 E	5350	4-1	55.1	24.9	26.3	21.7	23.5	39.7
Quartz Mountain		811	2 38S	16E	5320	4-1	0.0	0.0	8.2	0.0	0.0	15.7
Crowder Flat (California)			30 47N	11E	5200	3-30	0.0	0.0	0.3	0.0	0.0	-
Taylor Butte		842	16 33S	11E	5100	3-31	0.0	0.0	-	0.0	0.0	11.3
Lake of the Woods No. 1		835	11 37S	5E	4960	3-28	5.4	2.2	5.6	0.8	10.4	18.6
Hyatt Prairie Reservoir		723	15 39S	3E	4900	3-28	Patches		7.2	1.5	12.2	17.1
Richardson Ranch 2/			22 35S	14E	4800	3-31	0.0	0.0	0.0	0.0	0.0	0.8
Chemult No. 1		834	21 27S	8E	4760	4-1	Trace	Trace	8.4	2.0	5.2	18.7
Yamsey 2/			19 30S	11E	4600	3-31	0.0	0.0	0.0	0.0	0.0	2.2
Kirk 2/			1 33S	7E	4533	3-31	0.0	0.0	8.8	0.2	0.0	7.5
Beatty 2/			22 36S	12E	4300	3-31	0.0	0.0	0.0	0.0	0.0	0.0
Crystal 2/			26 34S	6E	4200	3-31	0.0	0.0	8.2	0.0	4.5	8.5
Pelican 2/			10 36S	6E	4200	3-31	0.0	0.0	2.5	0.0	2.0	5.5
Chiloquin 2/			34 34S	7E	4187	3-31	0.0	0.0	0.0	0.0	0.0	1.5
Rocky Point 2/			26 35S	6E	4150	3-31	0.0	0.0	0.0	0.0	0.0	3.6
Fort Klamath 2/			22 33S	7 1/2 E	4150	3-31	0.0	0.0	0.0	0.0	0.0	6.5

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GOOSE LAKE BASIN

Camas Creek	911A	5	39S	21E	5720	3-27	18.6	8.1	-	3.4	6.7	-
Strawberry	837	4	40S	16E	5600	3-28	3.0	1.7	8.7	0.0	4.0	-
Quartz Mountain 2/		33	37S	16E	5504	4-1	0.0	0.0	8.8	0.0	0.0	13.6
Quartz Mountain	811	2	38S	16E	5320	4-1	0.0	0.0	8.2	0.0	0.0	15.7

1. The first part of the paper discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the success of any business or organization. The author provides a detailed overview of the various methods used to collect and analyze data, highlighting the strengths and weaknesses of each approach. The second part of the paper focuses on the application of these methods in a real-world context, using a case study to illustrate the practical implications of the research. The author concludes by summarizing the key findings and offering recommendations for future research and practice.

The author's research is based on a comprehensive review of the existing literature, which has identified a significant gap in the understanding of the relationship between record-keeping and organizational performance. The study aims to address this gap by providing a systematic analysis of the data collected from a sample of 100 organizations. The results of the study show that organizations that maintain accurate records are more likely to achieve their goals and sustain long-term success. The author's findings are supported by a series of statistical tests, which demonstrate the significance of the results. The paper is well-structured and easy to read, with clear headings and sub-headings that guide the reader through the different sections. The author's writing is clear and concise, and the paper is free of any errors or typos. Overall, this is a high-quality piece of research that provides valuable insights into the importance of record-keeping in the business world.

IRRIGATION WATER SUPPLY FORECASTS

SEASON OF 1941

Foreword

Measurements of snow depth and water content were secured on all Oregon snow courses between March 22 and April 2. Watershed soil moisture determinations were carried out at several stations during the latter part of March.

Several Oregon snow courses are but newly established, and in view of the further fact that on very few of the courses do the records extend back for more than a few years, it has not been possible to arrive at definite correlations between water on the ground as snow and subsequent stream flow. However, more correlations are available this year than ever before. Full use has been made of correlations developed by engineers of cooperating agencies.

Lacking the extended records for some stream basins on which accurate forecasts must be based, but knowing information accumulated to date to be of value in forming estimates of prospective water supplies for Oregon in 1941, the usual water forecast committee meetings were held in important irrigated regions of the State for the sixth consecutive year during the period April 1 to 12 as follow: The Dalles for Northcentral Oregon; Pendleton for the Umatilla-Walla Walla Basin; Baker for Eastern and Northeastern Oregon; Lakeview for Southeastern Oregon; Prineville for Central Oregon; Klamath Falls for Southern Oregon; and Portland for the Columbia River Basin, embracing drainages in seven States and British Columbia. Most of the cooperating agencies were represented at those round table discussions.

An informal report of each meeting's results, outlining the irrigation water supply prospect for 1941 in each area, is reproduced herewith. Later modifications of the forecasts may be required in accordance with deviations of precipitation and temperature from normal during the run-off season.

Forecasts

Northcentral Oregon

Snow surveys show that watershed snow water supplies in this region are less at elevations above 5,000 feet than last year and at lower elevations compare closely to last year when the supply was far below average. Watershed soils are not as well primed apparently as last year. Therefore, prospects are for an irrigation water supply even less than last year and comparing closely to that of 1934. Reduction of ditch flow may come a week to ten days earlier than last year. Furthermore, the usual April stream run-off is not to be expected in 1941.



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The east fork of Hood River is unusually low for this season of year, but reservoirs supplying the Oak Grove region are full or nearly so. Lack of snow measurements on the north side of Mt. Hood slightly clouds a close forecast estimate, but irrigators in the Hood River Irrigation District may expect to go on rotation earlier this year than in 1940 and before July last.

Favoring maximum use of the limited water supplies in sight in The Dalles area is the early growing season which has advanced orchard and general crop growth about three weeks. A corresponding maturity date may be expected, thus reducing the need of late irrigation for tree and truck crops. Crop land soil moisture is better than usual and has penetrated to an average depth of approximately 62 inches in this area -- about 6 inches better than last year.

Farmers and fruit growers in this area are urged to make as full use as possible of early spring stream flow in order to get irrigated lands well wetted in preparation for the later shortages. Farming methods that will conserve moisture seem strictly in order.

An extended forest fire season is expected to result from deficient snow cover.

Umatilla-Walla Walla Basin

Unlike previous years, precipitation on watershed highlands has been markedly deficient, while in valleys below precipitation has been sufficient to restore crop-land soil moisture to better than average condition. Above normal temperatures in conjunction with a record-breaking March precipitation deficiency combined to reduce April 1 mountain snow storage to the lowest figure since 1934. Watershed soil moistures are believed lower than average due to the current precipitation deficiency and accumulated shortage from below average stream flow of 1940. Reservoir storage outside of the Hermiston Irrigation District is below average.

A serious water shortage is foreseen for lands served by the Walla Walla River as that stream is expected to have the least flow for the stream year 1940-41 of any year since records are available. Flow for the six months period April-September, 1941 inclusive, will be similarly low. There seems no prospect for restoring depleted ground water supplies in this area during the spring of 1941 and underground supplies available for pumping later this season also are expected to be the least of record. Insufficient replenishment from limited gravity irrigation supply cannot substitute for charging from flood waters. The growing season is not sufficiently advanced from normal to be of much effect in minimizing the impending water shortage by advance in date of crop maturity.

Tabulated stream flow forecasts follow:

Stream	Run-off Obtained in Acre Feet		Forecasted Run-off in Acre Feet	
	Stream Year	Six Months	Stream Year	Six Months
	1939-40	Apr.1-Sept.30	1940-41	Apr.1-Sept.30
So. Walla Walla River	111,216	54,334	89,000	45,000
Umatilla R. at Gibbon	-	-	95,000	35,000
Umatilla R. at Pendleton	302,000	98,360	164,500	40,000
McKay Creek	59,890	19,623	35,000	5,000
Butter Creek	8,717	3,443	5,500	1,000

Cold Springs reservoir is full. McKay reservoir supplying the Stanfield and Westland Projects may peak in storage at 38,000 to 39,000 acre feet, giving a usable release of 34,000 to 35,000 acre feet. Early irrigation as expected could cause withdrawal rate from McKay to exceed inflow by mid-April. Estimated water supply available to lands in the Stanfield and Westland areas will probably not exceed 50 percent of the usual supply and is forecasted to be on the order of 3.5 acre feet per acre net to the farmer's headgate for 1941. So far as unregulated flow of the Umatilla River is concerned, late water is expected to be available only for the earliest rights. The West Extension ditch will also feel somewhat of a late shortage.

Flow of Willow Creek is not expected to hold up beyond another two weeks, unless unusual spring rains materialize. Ditch Creek heading in the John Day watershed is estimated to be at its peak and has run out about half the flow to be expected.

Soil moisture conditions in wheat lands near Pendleton are better than average and favorable to dry-land production. On the heavier lands east of Pendleton, water stored in the upper five feet of fallow land is now equivalent to 14.8 inches of water, as compared to a ten-year average of 12.7 inches. In land cropped last year the present moisture in the upper five feet is equivalent to 11.5 inches as compared to a ten-year average of 10.7 inches. The 1941 wheat crop here can apparently be matured without more rain. Soil moisture in wheat lands near Helix appears better than for several years. Soil moisture penetration in Athena dry lands is reported at approximately 60 inches. In sagebrush land near Hermiston having a fair growth of cheat, the upper 4 inches of soil is reported dry, but moisture penetration is down to 60 inches. Such penetration is better than some years and about the same as in 1940. Dry land soil moisture conditions near Moro are reported as better than average.

Forest range prospects in the Umatilla Forest appear good, but without sustaining rains late forage will be short. An extended forest fire season is in sight because of the extremely scanty snow cover.

Northeastern Oregon

Snow supplies on the headwaters of Burnt River have been materially reduced since March 1 by early melting; nevertheless, April 1 measurements

show the remainder to exceed that of last year on the same date by almost 60 percent, and the stored snow water materially exceeds that of April 1, 1939. Watershed soil moisture also is superior to that of 1940 as shown by samples at Blue Mountain Summit. Accordingly, greater flow for both the April-September, 1941 and July-September period, 1941 is to be expected in comparison with last year. After Unity reservoir is filled (it lacks 3,000 A.F. of being filled to capacity) it is estimated that available run-off for spreading on wild hay lands will total 10,000 A.F., or about 25 percent more than last year.

Snow supplies on the main Powder River at all elevations were slightly reduced during March by early melting and the stored snow water remaining is slightly less than last year. Ground storage appears slightly improved over last year, so while the total flow of the Powder River for the six months ending September 30, 1941 is likely to be the same as for the same period in 1940, it is probable that flow during July, August and September may exceed that of last year by 5 to 10 percent.

Crop land soil moisture in the Baker valley is better than for several years and the growing season appears about two weeks advanced as compared to last year. All in all a more satisfactory irrigation season is in sight here than in 1940.

Thief Valley reservoir is full and overflowing.

Low flow of the North Powder during July-September and total flow during the next six months ending September 30 are both expected to be about 10 percent less than last year. Water stored in snow at the highest levels is less than last year.

The outlook for mid-summer and late water supply to lands served by the Grande Ronde River and its tributaries in the Grande Ronde valley is not too encouraging, as stored snow water on nearly all courses is less than last year. Watershed ground storage is fair but an accumulated deficiency from recent years of below-normal snowfall may have some reducing effect. The Grande Ronde River at gaging station No. 1816 is expected to show an April-September run-out somewhat less than in 1934. Peak flow is probably past. Catherine Creek snow water supply is slightly under that of last year and south slopes at lower elevations are melted bare. This stream may have peaked about April 1, and run-off during the April-September period is estimated as about 20 percent less than for the same period last year, but an advanced growing season with probable advance in maturity dates may offset this deficiency. Tabulated stream flow forecasts follow:

Stream	Run-off Obtained		Forecasted Run-off	
	in Acre Feet		in Acre Feet	
	Stream Year	Six Months	Stream Year	Six Months
	1939-40	Apr.1-Sept.30	1940-41	Apr.1-Sept.30
Grande Ronde River at #1816	148,000	33,300	140,000	30,000
Catherine Creek	69,700	25,700	65,000	20,000

Valley farm soils appear to have a better soil moisture content than last year. Spring seeding is three weeks advanced over last year. Hay crops are equally advanced in growth.

Over in the Wallowa mountains snow water content on the Aneroid Lake course is slightly less than last year, but on the south side of the mountains at Schneider Meadows stored snow water is very much better than last year and appreciably better than in 1939. Greater water supplies for the season of 1941 than in 1940 are seen for the Pine Creek and Eagle Creek valleys. Wallowa Lake now has in storage approximately 19,000 acre feet, 6,000 acre feet more than at this time in 1940, and with slightly increased stream flow over last year the total irrigation supply available to ditches served from Wallowa River appears to be from 6,000 to 7,000 acre feet more than last year. The growing season is similarly advanced as in the Grande Ronde valley and crop land soil moisture is favorable to delay in withdrawal of storage water. Accordingly, the 1941 irrigation outlook in the Enterprise area is better than in 1940. The outlook on the Imnaha River is for a good sustained summer flow. Tabulated stream flow forecasts follow:

Estimated Stream Flow for Apr.-Sept.incl,1941

Stream	Percent of last	Percent of	Acre Feet
	yr. same period	10-yr. avg. 1929 - 1938	
East and West Fork			
Wallowa River combined	103	---	58,000
Hurricane Creek	100	88	33,000
Lostine River	106	89	94,000

Eastern Oregon

Peak flow of the Owyhee River is probably past, but Owyhee reservoir is full, thus putting a two-year irrigation supply in sight for lands served by this reservoir. Run-off for the season ending September 30, 1941 is estimated at 600,000 acre feet, or 73 percent of normal, with 351,000 acre feet so far realized and 249,000 acre feet estimated yet to come. Low flow of the Owyhee during late summer of 1941 should be better sustained than last year.

Antelope reservoir is expected to fill to capacity by April 12. Jordan Creek is not likely to exhibit any great peak flow from now on out, but low flow should be better than last year. Crop land soil moisture in Jordan Valley appears the best for several years, but unlike numerous areas elsewhere in Oregon there is little if any advance in the growing season as compared with last year. In a similar way on lands near Ontario under the Owyhee and Malheur Rivers ideal conditions for seed-bed preparation exist and present prospects are for a very good growing season.

Both Agency valley and Wamsprings reservoirs on the Malheur River are either full or can be easily filled within a very short time. Total

flow of the Malheur River middle fork for the year ending September 30, 1941 is estimated at 129,000 acre feet, or 106 percent normal, with 40,000 acre feet yet to come. Total flow of the Malheur River north fork for the year ending September 30, 1941 is estimated at 84,500 acre feet, or 130 percent normal, with an estimated 30,000 acre feet yet to come. Total flow for 1941 on both forks combined should slightly exceed that of last year. Although the irrigation season is a month advanced as compared with last year, a very substantial hold-over in these reservoirs is anticipated at the end of the 1941 irrigation season.

The middle fork of the John Day River is expected to show about the same April - September, inclusive discharge as in 1940, but the extreme low flow, barring unforeseen weather conditions, is estimated to be a little better than last year. Strawberry Creek, one of the upper tributaries, is estimated to flow 93 percent of last year for the April - September, inclusive, period and its flow for this period should be about 90 percent of the 11 year average 1929-39. Low summer flow of this stream should be slightly better than last year. Crop land soil moisture in the John Day valley is good, but drying north winds and markedly deficient spring rains are depleting the moisture near the soil surface. Prospects for spring range in the Malheur Forest are reasonably good, partly due to the rather good hold-over of fall grass, and to fairly good seed germination this spring. The outlook from now on is dependent upon adequate spring and summer rain. The same forest range conditions also apply in general to the Whitman Forest. The outlook for range stock water on both of these Forests is improved over last year.

Considerable snow melting occurred below the 6,500 foot contour during March on watersheds supplying the Harney Basin, but even so, remaining snow supplies are generally better than last year at this time. The Silvies River has been discharging from 950 to 1200 cubic feet per second since February 24 with the result that all valley hay lands are well wetted. Silver Creek started its run about February 20 and has been discharging part of its flow into Harney Lake for some time. Both total flow and low flow of this stream should be 25 percent better than last year. Water from the Silvies River has been reaching Malheur Lake since January. This stream is estimated to discharge 105,000 acre feet during the stream year ending September 30, 1941 as compared with an approximate discharge of 93,000 acre feet during the last stream year. Peak flow of the Blitzen River is yet to come and it is expected to have the best run-out since 1938 and may exceed that year. Streams running west into Catlow Valley should have a summer flow at least as good as last year.

Southeastern Oregon

A marked precipitation deficiency through the area during March, supplemented by above normal temperatures and drying north winds, resulted in early snow melting with little run-off. Residual snow supplies on watersheds of the area's eastern half are considerably above those of last year but in the area's western part the remaining stored snow water is somewhat less. The dividing line between these two areas may roughly be considered the Burns-Lakeview Highway.

$\frac{d}{dt} \left(\frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$

In the western section Thompson valley reservoir, with a total capacity of 19,000 acre feet has 3,730 acre feet in storage against 10,700 acre feet a year ago. It is estimated this reservoir will peak at about 7,500 acre feet. While the total water supply in sight for lands irrigated from this source is likely to be at least 25 percent less than last year, the supply should be adequate if carefully used.

Cottonwood reservoir with 1,500 acre feet in storage will fill to capacity limited by agreement (4,160 acre feet). Drews reservoir with 52,000 acre feet in storage, will fill to capacity.

The total flow of Chewaucan River will probably not exceed 80 percent of last year for the stream flow year and low flow should be similarly reduced. The break to low flow should come as early at least as last year.

Conditions in Varner valley are better than those in the Paisley area. With at least as good a run-off from Twenty Mile and Deep Creeks in prospect and with Hart Lake filled to a higher stage than last year, prospects are for coverage of 6,500 acres from Hart Lake overflow as against 2,000 acres covered last year. As a matter of fact, both total flow and low flow of both Deep Creek and Twenty Mile should be better than a year ago as snow supplies at the headwaters of both are materially better than last year and ground moisture should be above average. Break to low flow on these streams should come later in the summer than last year.

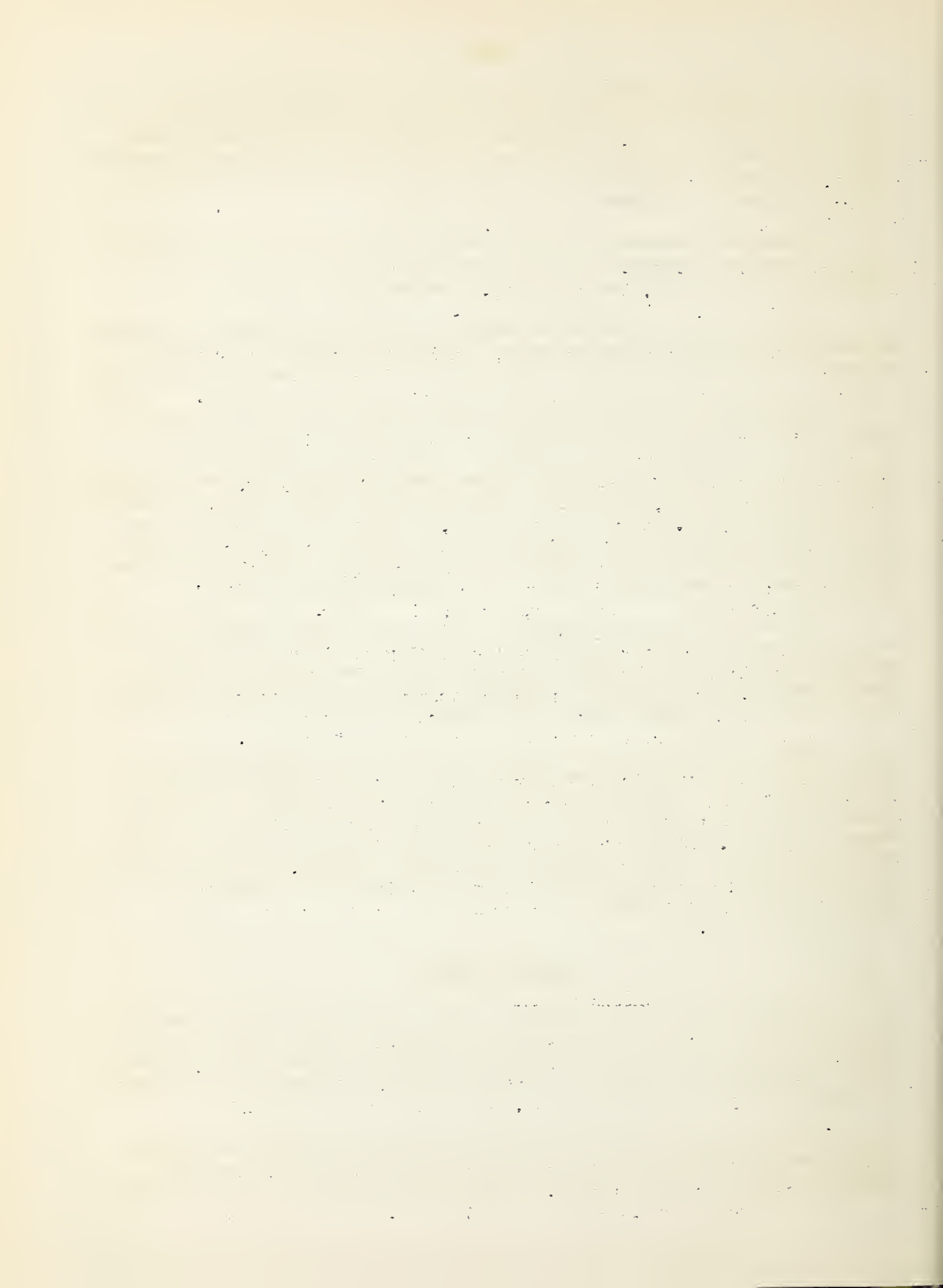
The smaller streams tributary to Goose Lake valley should run about the same total flow as last year but with delayed break to low flow as compared with last year. Crop land soil moisture conditions are better than average and the dry March encouraged greater early seeding than last year. The growing season appears very nearly a month ahead of average.

Forage conditions on the high desert range are fairly good with a good hold-over of fall grass and spring grass getting a start with good early April rains. Prospects for spring range on the Fremont Forest are similarly moderately good. Stock water prospects in the Forest on the Summer Rim are about like last year when several springs went dry. Stock water holes in the high desert range are fairly well filled with the greatest filling in the eastern division and with prospects for sufficient water in all of these ponds.

Central Oregon

Unmelted snow water at highest elevations of the watershed contributing to Ochoco reservoir is from 10 to 20 percent greater than last year, but at lower elevations the snow cover is entirely melted. The low snow cover was prematurely melted last winter too, so the seasons are not unlike in this respect.

Watershed soil moisture is believed to be as favorable to maximum yield from stored snow water as last year, judging from watershed soil moisture samples at Ochoco Mountain station (see Page 6). The watershed



soil is altogether unfrozen.

Ochoco reservoir now has in storage 12,450 acre feet, an increase of 2,000 acre feet during the past ten days. If withdrawal does not occur earlier than now anticipated, the reservoir should peak in storage at 17,500 acre feet about April last. This compares with peak storage of 27,000 acre feet in 1940. Water withdrawn from storage last year equalled 25,000 acre feet, or about 7,500 acre feet more than is expected available this year. Reservoir hold-over by the close of this irrigation season cannot be expected. The growing season is not advanced above normal, but is behind last year and later than average. Therefore, conservation of limited water supply cannot result from earlier than usual crop maturity. On the credit side, however, is a very favorable crop land soil moisture condition, particularly in valley floor lands, which will favor delayed storage withdrawal. Crop land soil moisture is relatively less favorable on the bench lands and the irrigation water supply for the bench lands is expected to be short.

Increasing the percentage of fallow land and reducing acreage planted to grain and to potatoes would aid in providing a satisfactory water supply to Ochoco District lands.

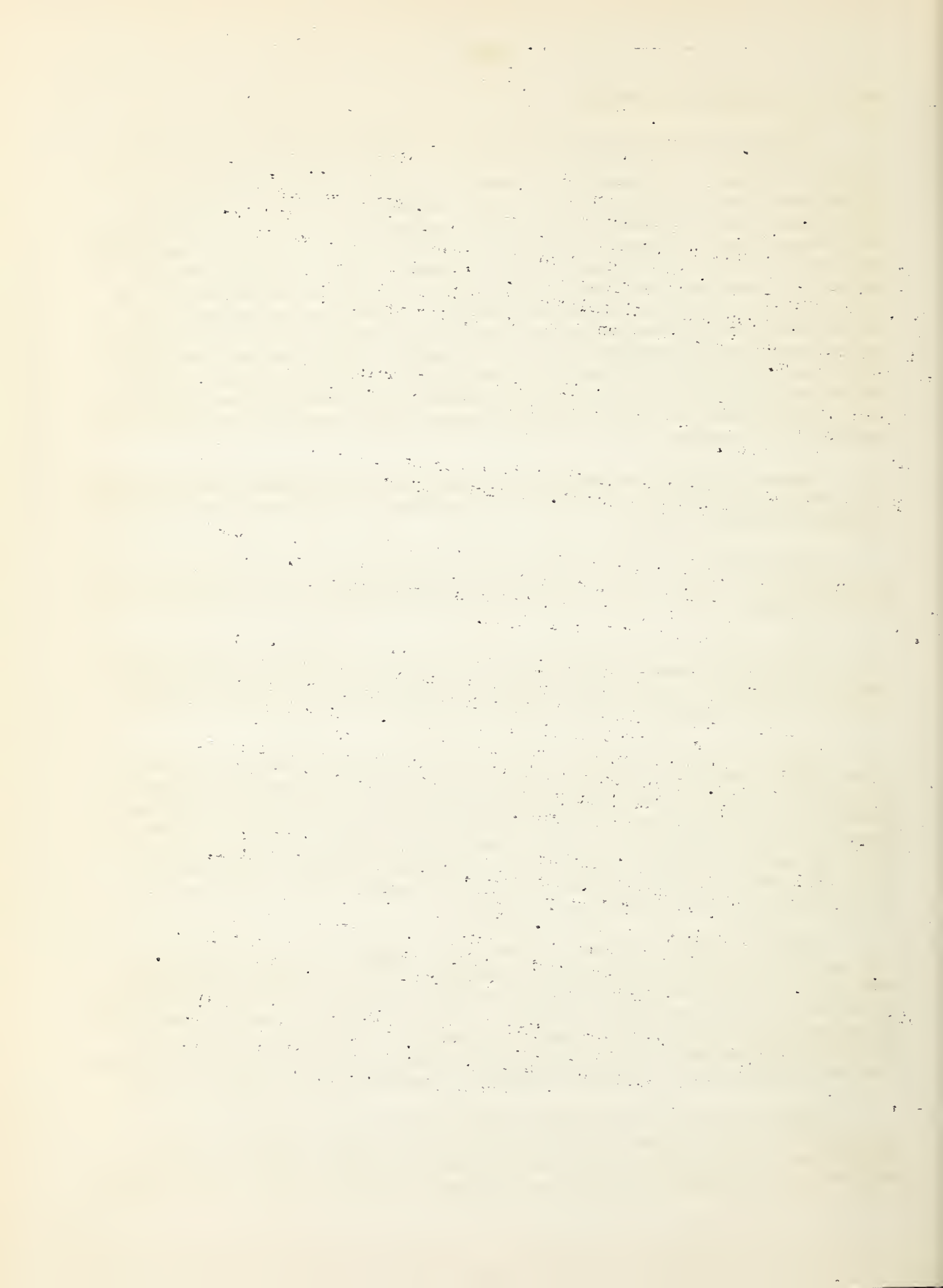
Prospects for summer range in the Ochoco Forest are spotty and rated as only fair. Stock water may be short, particularly on the Mitchell side of the Forest.

The outlook for mid-summer and late water supplies to lands supplied from the Upper Deschutes River is not as favorable as last year, and in fact, the outlook is for a very critical water shortage in this area with a water supply outlook no better than in 1931.

Tumalo Project lands may expect less water than last year. Stored water supply could be exhausted by August first and the gravity supply thereafter available from Tumalo Creek through the Columbia Southern canal should be only 90 percent of that available last year. Natural inflow to Crescent Lake is expected to equal approximately 6,000 acre feet for the April-September period. This would be less than in 1931; equivalent to about 65 percent of the inflow last year and equal to 50 percent of the past 12-year average for the same period.

Natural outflow (natural inflow less estimated evaporation) for the six months period April-September, inclusive, 1941 is estimated at 1,000 acre feet or only one-sixth of last year for the same period and only about 9 percent of the past 14-year average. The reservoir is estimated to peak at 24,000 acre feet, or 30 percent of capacity. Peak storage last year was about 42,000 acre feet. More rapid drainage than usual from this reservoir will increase the available supply by approximately 1,000 acre feet.

Natural flow of Tumalo Creek (Tumalo Creek plus Columbia Southern Canal) for the six months period April-September, 1941 should be about 29,500 acre feet. This would equal 86 percent of last year's flow for the same period and about 70 percent of the past 13 years' average flow for the



same period. Late natural flow during July-September, inclusive, should equal approximately 80 percent of last year's discharge during the same period and about 60 percent of the past 13 year average.

Snow stored water on Three Creeks Meadows snow course on April 1, 1941 is the least ever recorded there for this season of year since the first measurement in 1928. Flow of Squaw Creek at Station 335 for the April-September, inclusive, period should be approximately 34,000 acre feet, less than last year and less than in 1930, 1931 or 1934, other dry years in the past decade. Temperatures substantially above normal during April, May and June might increase this prospective run-off to 38,000 acre feet. Total flow for July-September should be nearly as great as in 1940, but about 10 percent less than in either 1931 or 1934. The Plainview and McAllister ditches are not likely to receive any water except stock water alone every two weeks. The Squaw Creek Irrigation District Canal can expect a decreased 1941 supply as compared to last year with a low August and September flow of not more than 35 to 40 c.f.s.

So far as Snow Creek Irrigation District is concerned, the irrigation supply there is not expected to exceed 80 percent of last year's.

Crane Prairie reservoir is expected to increase from present storage of 27,000 acre feet to a peak of 30,000 acre feet, about 75 percent of that obtained last year. Lands under the C.O.I. District with a water supply in sight similar to that of 1931 will probably have less water per acre than in that year due to the addition of 4,000 acres to the area since 1931.

Natural low flow of the Deschutes River during the April-September period is not likely to exceed 75 to 80 percent of last year for the same period.

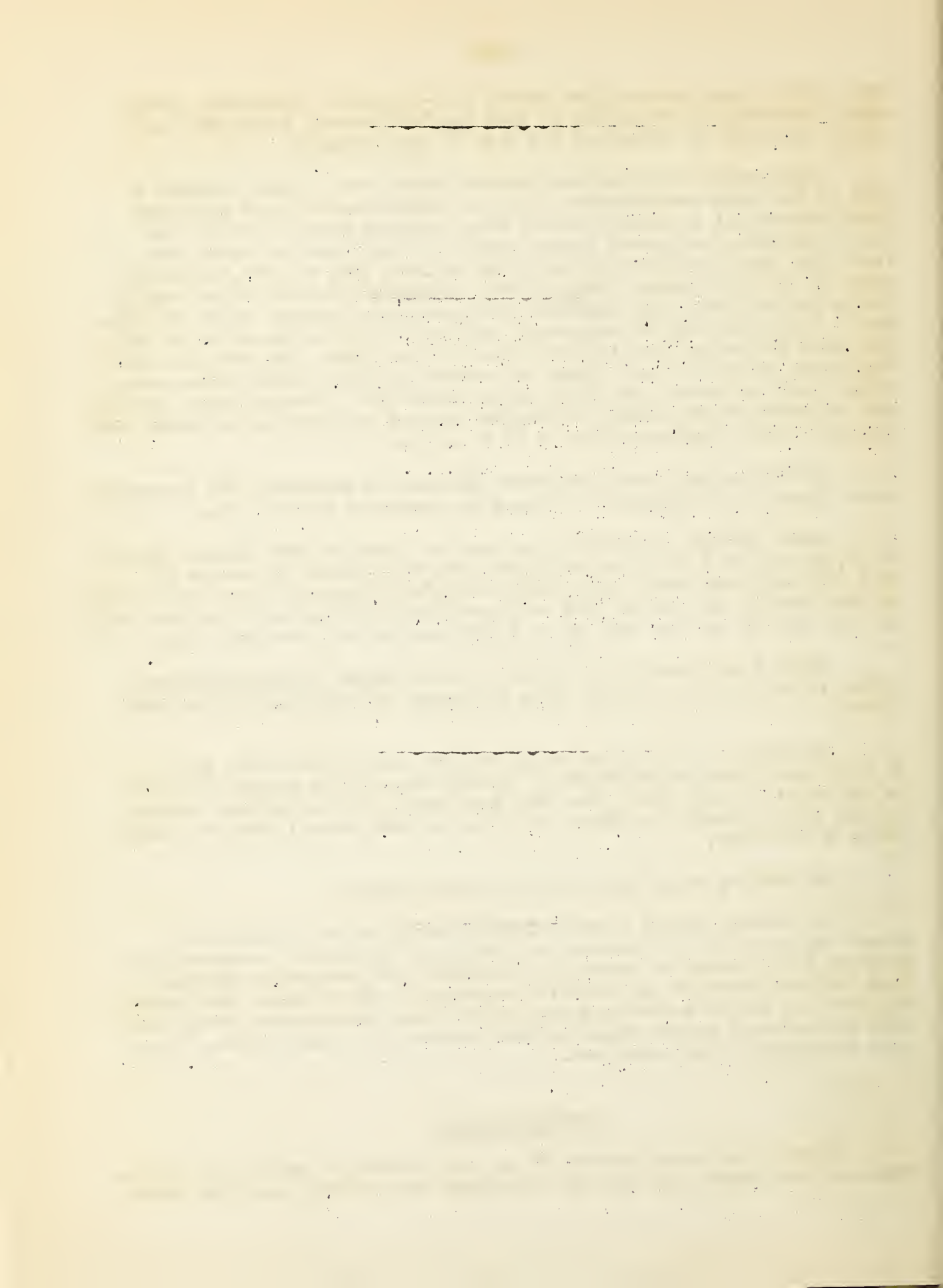
The Arnold canal is not likely to have natural flow after May 1. At their usual rate of withdrawal of storage water, this supply also will be exhausted by early July. The Lone Pine canal, with an outlook similar to that of the Arnold, is likely to be out of both natural flow and stored water by late July.

The Swalley canal will have 100 percent supply.

The growing season in the Deschutes Basin is not advanced from normal and is not as far advanced as last year. Therefore, advanced crop maturity dates cannot be expected to alleviate the prospective shortage. Crop land soil moisture is generally considered less favorable than during the past two spring seasons and very considerable early spring irrigation will be necessary unless unusually heavy spring rains come at once. General irrigation is now under way.

Southern Oregon

April 1 snow water content on all snow courses, regardless of elevation was below normal and with few exceptions was a little less than last



year. There have been years in the past record when snow supply was less than in the current year however. Watershed stored soil moisture is variable, but judging from records at Annie Spring and Fish Lake soil moisture stations, this factor, although slightly less favorable to maximum run-off from stored snow supply than last year, is more favorable than in some past years.

Total flow of Rogue River at Ray Gold for the stream flow year 1940-41 should be about 71 percent normal as contrasted with 84 percent normal last year. Mean low flow for the period July-September, inclusive, is estimated at 95 percent of last year. Mean low flow for the month of July, 1941, is estimated at 865 cubic feet per second, for August 815 cubic feet per second and for September 770 cubic feet per second. This will result in late summer canal alternation by the Grants Pass Irrigation District and alternation is expected to begin between July 25 and August 1. Alternation began last year on August 10. Crop land soil moisture in the Grants Pass area is now quite favorable and no immediate need for irrigation is foreseen although much depends on the weather in the near future.

The Applegate River through July-September inclusive, should have a flow at Cameron Bridge of 95 percent of that for the same period last year and about 130 percent of that for the same period in 1939. August flow may be a little short. The Little Applegate should flow in a similar relationship to last year as the Big Applegate but break to lowest flow is expected in July.

Other tributaries to the lower Rogue such as Evans Creek, Graves Creek, Jump-off Joe and other small streams entering from the north are expected to have both total flow and low flow materially reduced from last year and this is expected to be the shortest water supply year on these streams since 1931. This condition is similarly expected to apply to the main Umpqua River and its tributaries principally depended upon for irrigation supply, such as Cow Creek. The Illinois River, on the other hand, should have a mid-summer and late summer flow comparable to last year with low flow about 95 percent of last year.

The North Fork of Rogue River is forecasted to have a flow during the six months period April-September equal to 63 percent normal compared to 71 percent normal last year for the same period.

Farm soils in the upper Rogue River valley and Bear Creek valley near Medford contain less soil moisture than last year and are not as well wetted as on the average for the past five years. The soil moisture is not enough below average to be of importance.

It seems evident that irrigated lands in the Medford and Rogue River Irrigation Districts in Jackson County are facing a critical water shortage. With Fish Lake reservoir expected to peak in storage at 4,000 acre feet and Four Mile reservoir expected to peak in storage at 6,500 acre feet, the total anticipated stored supply will be about 65 percent of that obtained last year and will provide an estimated storage supply of between 8 and 9

acre inches per acre at the reservoirs. This will be about 50 percent of the requirement when finally delivered to the land. Under normal demand and use conditions, this storage supply may be expected to furnish water for about five weeks. Delay in initial withdrawal until June 1 should stretch the stored supply until early or mid-July. Flood water supply is expected to be insufficient to meet all demands after May 1 along the west side of the Medford District and insufficient after about April 20 along the east side of the District. Crop maturity in this area, because of the early growing season, is expected to be two weeks early, and this will help some in alleviating the serious late shortage anticipated.

The outlook for irrigated lands under the Talent District near Ashland is not too good, but extreme care in water use will greatly aid in preventing a serious crop loss. Whereas this District is accustomed to a storage use of 16,000 acre feet in years of sufficient supply, and in some years has used much more than this amount, it is forecasted that total storage to be accumulated this year will be 14,500 acre feet (6,300 A.F. in Hyatt reservoir and 8,200 in Emigrant reservoir) equivalent to 80 percent of last year. The outlook for flood water supply is about the same as in the Medford District. McDonald Creek canal through Wagner Gap will probably cease water delivery about June last. If storage withdrawal from reservoirs of the Talent District can be delayed until May 15, the stored supply could last until August 15. Crops that will suffer the most are late pears and apples, tomatoes, pastures and late truck crops.

All possible means of conserving irrigation supply are being advised here as elsewhere. Water will be delivered on a measured basis in 1941 in all three of the above Districts.

The net inflow to Upper Klamath Lake for the stream flow year, October 1, 1940 to September 30, 1941 is set at 875,000 acre feet as against 1,109,500 obtained last year, and inflow is expected to be 70 percent normal. April-September, inclusive, inflow is set at 69 percent of last year.

In the Clear Lake reservoir area, the winter of 1940-41 was very mild, and most of the precipitation fell in the form of rain. There was no snow at the Crowder Flat snow course on April 1st. Total precipitation for the stream year up to April 1, 1941 at Clear Lake Dam was 8.52 inches, or 19 percent above average. While precipitation on this watershed was above average, the total yield for the stream year 1940-41 is estimated at 97,000 acre feet or about 90 percent of average. On April 1, 1941, the available storage in Clear Lake reservoir was 257,790 acre feet as compared to 277,920 acre feet on the same date last year. This storage is sufficient to provide a two years' supply for the lands irrigated from this source.

Similar conditions as those at Clear Lake prevailed on the watershed tributary to Gerber reservoir. On April 1st there were only a few snow banks on the snow course at the Strawberry station. Precipitation at Gerber dam totalled 12.69 for the period October 1, 1940 to March 31, 1941, or 8 percent greater than average, while the total run-off for the stream year 1940-41 is estimated at 42,000 acre-feet or about 81 percent of average. The available storage in the reservoir on April 1st was 62,420 acre-feet

as compared to 80,120 acre feet on the same date last year. This storage provides a two years' supply for the lands served from this source.

The season is well advanced for this time of year, and water was turned into the heads of project canals on April 6th. All lands receiving their water supply from works of the Klamath Project are assured and abundant water supply during the current season.

Prospects for spring range in the Rogue River National Forest are fair. In the range land east of Klamath Falls prospects on the higher range appear a little better than last year, but on the lower range are rated only fair.

* * * * *

- 1/ The snow measurements are made principally by field personnel of the following organizations:

STATE

Idaho Cooperative Snow Surveys
Nevada Cooperative Snow Surveys
Oregon Agricultural Experiment Station
Oregon State Engineer and corps of State Watermasters
Oregon State Highway Engineers

FEDERAL

Department of Agriculture
Forest Service
Soil Conservation Service
Department of Commerce
Weather Bureau
Department of Interior
Bureau of Reclamation
Fish and Wildlife Service
Geological Survey
Indian Service
National Park Service

PUBLIC UTILITIES

Eastern Oregon Light and Power Company
Portland General Electric Company
The California Oregon Power Company

MUNICIPALITIES

City of Corvallis
City of LaGrande
City of The Dalles

MUNICIPAL DISTRICTS

Central Oregon Irrigation District
Deschutes County Municipal Improvement District
Grants Pass Irrigation District
Jordan Valley Irrigation District
Lakeview Water Users' Association
Medford and Rogue River Irrigation Districts
Ochoco Irrigation District
Warm Springs Irrigation District

- 2/ Water content determined by melting a measured sample.
(The California Oregon Power Company's station.)

